

all the more advisable to enter these in the catalogue, with appropriate remarks, so that systematic explorations might be made when the opportunity presented itself for raising a fund for the purpose. Even when local histories or traditions are decided respecting the age of any earthwork or other ancient structure, but little credence can be attached to such traditions until actual investigations have been made. As far as my own experience goes, and from information derived from other sources, it would appear that local tradition is the bane of the scientific archæologist. There is, for instance, hardly any prehistoric monument in this country that has not been pronounced Roman by some antiquarian authority, an opinion which not only has often been proved by excavation to be erroneous, but which has also had the pernicious effect of checking further inquiry.

In recommending to your societies the actual investigation of the minor prehistoric remains of your districts as a task well worthy of the attention of any scientific body, it is perhaps not wholly necessary to urge that any excavations attempted should be carried out with the most scrupulous care, and the materials removed restored if possible on the completion of the work, so as to avoid any permanent disfigurement. The so-called "exploration" of many ancient structures whose venerable antiquity should have rendered them sacred has often been conducted in a manner which can only be called an act of desecration. How frequently do we read in local histories such statements as the following:—"On ——— Common there formerly stood a large mound of earth supposed to be a tumulus, which was opened by Mr. ——— in the year ———, but nothing of any interest was found *except a few fragments of pottery and some decayed bones*"! Such passages as this, which is not a verbatim extract but simply an ideal specimen illustrating the kind of destruction that has been going on, lead to the supposition that the prevailing idea in opening a tumulus is the discovery of hidden treasure. Any other find is considered devoid of interest, and the scientific value of the structure is for ever lost by the scattering of its contents.

The ancient monuments committees of local societies, in addition to the preparation of catalogues and the conduction of explorations, would have another important function to fulfil: they might take upon themselves the duties of vigilance committees, keeping a watchful eye upon the ancient remains in their neighbourhood, and preventing as far as possible their destruction. In the case of minor remains which were not considered worth scheduling for State protection, opportunities would often occur for investigating without incurring the expense of systematic excavation. In the course of building or agricultural operations old ramparts are frequently cleared away in perfect ignorance of their value to the archæologist; or again, a new road has to be made, which in its course passes through the remains of some ancient earthwork now almost obliterated by the hand of time. In such cases the vigilance committee, having previously catalogued the remains threatened, would endeavour to come to some arrangement with the owner of the property, and obtain permission to appoint watchers for the purpose of recording the nature and position of any relics that might be found. The fact that local societies have not in past times been sufficiently alive to the important work which might thus have been done by taking advantage of any unavoidable demolition of prehistoric remains has led to the destruction of a vast amount of material which, under proper supervision, might have furnished facts of lasting importance to anthropological science. It remains with your respective societies to determine whether such ruthless waste of evidence is to be allowed in the future.

OBSERVATIONS ON HEREDITY IN CATS WITH AN ABNORMAL NUMBER OF TOES

DURING the last few years I have had occasional opportunities of studying heredity in various families of cats with an abnormal number of toes, and whose ancestors for some few generations at least, have possessed the same peculiarity. The observations have now been continued over a period long enough to render their publication a matter of interest. I first became acquainted with these cats in the winter of 1878, when staying near Haverfordwest. I made inquiries on seeing one of them for the first time, and ascertained that it had been obtained from Mr. Edward Vaughan, of Fern Hill, Haverfordwest, a relation of the friend with whom I was staying. Shortly afterwards I saw Mr. Vaughan, and had a long talk with him about

the peculiarity. At the time I took notes of his experience, and he has since kindly written to give further information. He first became acquainted with two generations of tortoiseshell cats with the normal number of toes (living respectively to the ages of eleven and twenty). Then in the third generation the extra toes appeared (this cat died aged nineteen, and was also a tortoiseshell). This cat or the mother was brought from Bristol to Haverfordwest. The peculiarity was inherited by "Punch"—a cat now living, and fifteen years old last May, also a tortoiseshell—making four generations. "Punch" has six toes on each fore foot, and six on each hind foot, but two of her kittens have had seven on hind and fore feet, and all varieties between the extreme and normal form have occurred commonly. It is a very curious and interesting fact that now in her old age all her kittens have the normal number of toes. Mr. Vaughan is of opinion that the peculiarity is also dying out among "Punch's" descendants, but this is by no means my experience with the branch of the family I have observed. He also gained the impression that the female kittens were more affected with the peculiarity than the males. Mr. Vaughan also made the interesting observation that the peculiarity reappeared in the kittens of a normal female cat (a daughter of "Punch's"), although in smaller proportions.

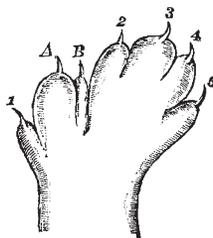


FIG. 1.—Right fore paw from above, with extra toes.

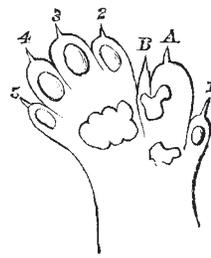


FIG. 2.—Right fore paw from below, with extra toes.

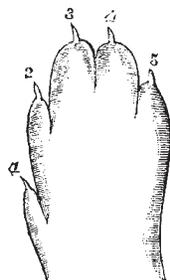


FIG. 3.—Right fore paw from above, normal.

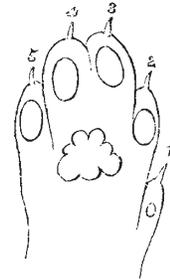


FIG. 4.—Right fore paw from below, normal.

In the spring of 1879 Mr. Vaughan very kindly sent a female tabby kitten to my home at Reading. This was a daughter of "Punch's," and it possessed six toes on each fore foot and six on each hind, thus rendering the feet very broad and giving them a most remarkable appearance. This cat, although rather wild, was very clever, being easily taught to "shake hands," and catching birds and even fish with surprising ease. When a little over a year old the first family (of four) was born, in the middle of June, 1880.

All the four kittens were tabbies, and I made the following notes of them:—(1) male: fore paws, five toes, but the insignificant innermost toe being absent, the foot appeared broad like the mother's; hind paws, five toes. (2) female: fore paws, five toes, same as (1); hind paws, six toes. (3) and (4) females: normal; five toes on fore paws, four on hind. No. (2) in this list was given to a friend, and will be again referred to. One normal female was also given away, but was soon lost without offspring; the other female was killed. There is nothing in the above list to support the view that the females are more affected than the males with the mother's peculiarity.

The next family of which I have notes was born May 13, 1881. The three kittens were tabbies as before:—(1) male: normal. (2) female: normal. (3) female: six toes on each fore and hind foot, as the mother. Here the only affected kitten is a female.

The next and last family of which I have notes was born August 26, 1881. I received notes of three kittens, but there may have been more:—(1) and (2) females: six toes on each fore and hind foot, as the mother. (3) sex not observed: six toes on all feet, as the mother.

After this I was unable to obtain notes, although many families were born, and a large proportion always possessed the peculiarity. Few people are aware of the immense difficulty in obtaining accurate notes of a simple observation such as this.

The mother was subsequently killed.

I now return to No. (2) of the first family, which was given to a friend on the condition that I received accurate notes of all families. I received *one* such account. This was of a family of four born in June, 1881:—(1) male: normal. (2) female: normal. (3) female: with five toes on the fore paws, six on the hind, same as mother. (4) female: the same as mother, but five toes on the hind feet. Here again the females possess the peculiarity. The mother was also a small, very clever cat, catching birds with the most wonderful ease. There were many families, in each of which quite half possessed the peculiarity, and many of the kittens had the same number of toes as the mother.

At last, about a year ago, a female tabby kitten appeared with *seven* toes on each fore paw, and six on each hind. This was given to me, and is now a small tabby cat, with a tendency

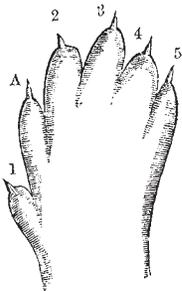


FIG. 5.—Right hind paw from above, with extra toes.



FIG. 6.—Right hind paw from below, with extra toes.

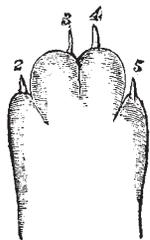


FIG. 7.—Right hind paw from above, normal.

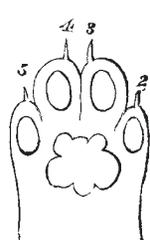


FIG. 8.—Right hind paw from below, normal.

towards tortoiseshell coloration on the back. A rough drawing of the right fore foot, as seen from above and below, is seen in Figs. 1 and 2. Drawings of a normal right fore foot are given in Figs. 3 and 4, for comparison. It is seen that the extra toes are those labelled A and B, and they confer the extraordinary breadth upon the foot. The most recently added is B, which is still partially coalesced with A, and has but one pad in common with it (Fig. 2). This last toe, B, was absent in the cat which I received from Mr. Vaughan. In the first family described, Nos. (1) and (2) possessed the largely developed extra toe, A, while the insignificant pollex (Fig. 1, 1) was absent, and thus the foot appeared extremely broad, although with only the normal number of toes. In walking the pollex does not touch the ground, but the claws A and B come down a little later than the rest of the foot, making a very distinct click when the cat is walking on floorcloth. This sound is particularly audible when the cat is coming down stairs. Comparing the pads on the underside of the foot with those of a normal animal (Figs. 2 and 4), there is seen to be an extra pad behind the additional toes, of which there is no trace in the normal foot. The left foot is similar to that drawn, except that there are traces of more complete fusion between the toes A and B in the slighter tendency towards division shown by their common pad. The right hind foot from above and below is given in Figs. 5 and 6, and a

normal hind foot for comparison in Figs. 7 and 8. The correlation of the toes is more difficult here, but there is little doubt that the innermost toe (Figs. 5 and 6, 1) is the hallux, lost in the normal foot.

Comparison with the fore feet renders it likely that the second extra toe is that labelled A in Figs. 5 and 6. On the underside (Fig. 6) all the toes have separate pads, and there is an additional pad behind the extra toes. This, in the left hind foot of the same animal is fused with the pad behind the other toes.

On July 10 last the cat I have just described produced a family of four tabby kittens. Strangely enough, they are all males, but they possess the mother's peculiarity to a remarkable extent.

(1) Forepaws: exactly similar to the mother's, but toes A and B are more distinct, in that they have separate pads in both feet. Hind paws: precisely the same as the mother's, even to the fact that the left hind pads are continuous and the right hind pads slightly discontinuous (as in Fig. 6). Thus this kitten exhibits on the whole an intensification of the characters.

(2) Fore paws: the pads of the toes A and B are fused as with the mother. The claw of B is broken off, but its base is seen almost springing from the outer side of the base of claw A. Both feet the same. Thus the character is rather less developed than in the mother. Hind paws: the large hind pads are continuous on both feet. All the six toes are distinct on both feet, as with the mother, but A and 2 on the left foot are united by skin, although considerable freedom of movement is possible. Here again the character is rather less than in the mother.

(3) Fore paws: pads of A and B are distinct on the right side. The claw of B is accidentally broken off. On the left side the pads are also distinct, although the toes A and B are joined by skin. Hind paws: all six toes distinct on both feet; the large hind pads continuous on both. Thus this kitten is beyond the mother in the separation of the pads of A and B on the fore paws. A and B were more distinct on the right side, where also in the mother the pad showed a greater tendency towards division.

(4) Fore paws: the greater tendency towards separation on the right side was very strongly marked here, inasmuch as the toe B is entirely absent on the left side, and the pad of A simple. On the right B is present, and its pad is joined to that of A, but a little more distinct than with the mother. Hind paws: all six toes distinct and large; hind pads continuous in both feet. Thus the character is, on the whole, less than in the mother.

This is the last observation made up to the present time, and it is a very remarkable one, in the entire absence of anything approaching the normal form, and in the fact that two of the kittens go beyond the mother, while the other two are but little behind. When the two sides differ, the difference is invariably as with the mother. At the same time the immense strength of heredity in all these cases is seen when we remember that it is practically certain that the fathers of the families have always been normal. It is quite certain with this last family, for the mother was brought as a kitten from Reading to Oxford, where there is a normal male cat living in the house with her. I have never heard of cats with the abnormal number of toes in either Reading or Oxford apart from these. Mr. Vaughan says exactly the same for his cats in South Wales. Thus we must conclude that the heredity is entirely through the females, and yet the character has gone on increasing in my branch of the stock in spite of the normal element which we should expect to be introduced and to make itself felt at each stage. I have known of the family through eight generations, and three of these have started from entirely new localities (*i.e.* Haverfordwest from Bristol, Reading from Haverfordwest, Oxford from Reading) to which they were sent as kittens. This is, of course, very important, as it has prevented the possibility of interbreeding between the abnormal cats derived from the same stock.

I hope to contribute a paper to a future number upon further observations, and upon the skeletal peculiarities that accompany the abnormality.

EDWARD B. POULTON

ON THE ELECTRICAL RESISTANCE OF THE HUMAN BODY¹

THE writer, after premising that hitherto electricity in its application to the human body had not come up to expectations reasonable in the case of so powerful a force, and

¹ Abstract of a paper read before the British Association at Southport, by W. H. Stone, M.A., F.R.C.P.